United States Patent Application

for

SEQUENTIAL READ-OUT METHOD AND SYSTEM THAT EMPLOYS A SINGLE AMPLIFIER FOR MULTIPLE COLUMNS

Inventor:

Brian James Misek

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SEQUENTIAL READ-OUT METHOD AND SYSTEM THAT EMPLOYS A SINGLE AMPLIFIER FOR MULTIPLE COLUMNS

FIELD OF THE INVENTION

The present invention relates generally to photocell applications, and more particularly, to a sequential read-out method and system that employs a single amplifier for multiple columns.

BACKGROUND OF THE INVENTION

There are many photocell applications. These photo cell applications use an array of photocells and related electronics to image objects of interest. Photocell applications can be generally categorized into far field applications and near field applications. An example of a far field application is a free space pointer that is utilized in hand-held video game controllers. A user holds the game controller in one's hand and moves one's hand to control a graphic element on the display. In these applications, the array of photocells is utilized to track the relative motion of the hand based on a distant pattern (e.g., pattern on the display).

An example of near field applications is an optical mouse that images the texture of a surface to provide cursor control. Other examples include hand-held scanners and movement encoder applications also employ arrays of photocells.

FIG. 6 illustrates a prior art architecture for sampling an array of photocells. The architecture includes an array of photocells that are arranged into R rows and C columns. The output voltage of each photocell is read out by employing a row and column address scheme.

Typically a row of photocells is provided as outputs onto the C columns. The photocell output voltage is commonly derived by a source follower that utilizes a column current source to provide the bias current.

The prior art architecture also provides an amplifier at the bottom of each column for reading out the output voltage of the photocells of the selected row. The amplifier can provide a sampling function, an offset cancellation, and buffering function for the column voltage.

One disadvantage of this prior art architecture is that requiring an amplifier for every column increases the number of components in the design, thereby increasing the size of the design. The increased size of the design translates to a higher cost to manufacture the circuit. Since space and cost considerations are important to achieve a competitive advantage in the marketplace, it is desirable for there to be an architecture that conserves area and reduces costs.

A second disadvantage of the prior art architecture is that the gains of the amplifiers in the different columns need to be matched in order to eliminate the stripping that would be apparent in the image due to the gain differentials. Gain matching for the amplifiers from column to column is difficult, time-consuming, and costly process. Consequently, it is desirable for there to be an architecture that obviates gain matching.

A third disadvantage of the prior art architecture is that the power consumed by the individual amplifiers is a major limiting factor in the use of these devices in battery powered applications in which the imager is on for significant portions of the time.

Based on the foregoing, there remains a need for a read-out circuit that overcomes the disadvantages set forth previously.